CLAIMS

What is claimed is:

1. A fuel injector comprising:

a housing having an inlet, an outlet and a longitudinal axis extending therethrough;

a valve seat disposed proximate the outlet, the valve seat including a sealing surface and an orifice;

a metering orifice located at the outlet, the metering orifice having a plurality of metering openings extending therethrough;

a needle being reciprocally located within the housing along the longitudinal axis between a first position wherein the needle is displaced from the valve seat, allowing fuel flow past the needle, and a second position wherein the needle is biased against the valve seat, precluding fuel flow past the needle; and

a controlled velocity channel formed between the valve seat and the metering orifice, the controlled velocity channel extending outwardly from the orifice to the plurality of metering openings.

2. The fuel injector according to claim 1, wherein the controlled velocity channel is a generally annular channel tapering outwardly from a larger height to a smaller height toward the metering openings.

3. The fuel injector according to claim 1, wherein the metering orifice is generally planar and perpendicular to the longitudinal axis.

4. The fuel injector according to claim 3, wherein the metering orifice includes a raised portion between the metering openings.

5. The fuel injector according to claim 4, wherein the needle includes a generally planar end face generally perpendicular to the longitudinal axis.

6. The fuel injector according to claim 5, wherein, when the needle is in the second position, the end face is spaced from the raised portion by a distance of between 50 microns and 100 microns.

7. The fuel injector according to claim 3, wherein the needle includes a generally rounded end face.

8. The fuel injector according to claim 7, wherein the metering orifice is generally rounded.

9. The fuel injector according to claim 1, wherein the needle has a generally planar end face generally perpendicular to the longitudinal axis.

10. The fuel injector according to claim 9, wherein, when the needle is in the second position, the end face is spaced from the metering orifice by a distance of approximately between 50 microns and 100 microns.

11. The fuel injector according to claim 1, wherein a first virtual circle defined by a virtual extension of the valve seat onto the metering orifice has a smaller diameter than a second virtual circle defined by the plurality of metering openings.

12. The fuel injector according to claim 1, wherein fuel flow across the metering plate is generally transverse to each of the plurality of metering openings.

13. The fuel injector according to claim 1, wherein a distance between adjacent metering openings is at least approximately two and a half times a diameter of each of the metering openings.

14. A method of generating turbulence in a fuel flow through a fuel injector, the method including the steps of:

providing a fuel flow under pressure to the fuel injector;

opening a valve in the fuel injector and allowing the pressurized fuel to flow past the valve and into an orifice;

directing the fuel flow at an initial velocity from the orifice into a controlled velocity channel formed by a valve seat and a metering orifice, the fuel generally maintaining a controlled velocity through the controlled velocity channel, the controlled velocity generating turbulence within the fuel flow; and

directing the fuel flow through at least one orifice opening downstream of the controlled velocity channel and out of the fuel injector.

15. The method according to claim 14, wherein the controlled velocity channel tapers from a first height at an upstream end of the controlled velocity channel to a second height at a downstream end of the controlled velocity channel, the second height being smaller than the first height.